

REMARKS

New claims 25-44 are currently being added. The amendments herein do not introduce new matter within the meaning of 35 U.S.C. §132. As such, the Examiner is respectfully requested to enter the amendments.

1. Rejection of Claims 16-24 Under 35 U.S.C. §103(a)

The Office Action states that claims 16-24 are rejected under 35 U.S.C. §103(a) as being unpatentable over WO 01/46274, equivalent to U.S. 2003/0130443 (herein referred to as "Suhm, et al."). In particular, the Office Action states,

Suhm's paragraphs [0311] to [0313] on page 14 as cited in the previous Office action teaches a process for making a supported catalyst comprising (i) reacting silica and methylaluminoxane (MAO) in a solution to provide a treated silica; subsequently (ii) contacting the solution of dimethylsilanediylbis(2-methyl-4,5-benzindenyl)zirconium dichloride and MAO with the treated silica to provide a slurry, and (iii) distilling off the solvent in vacuo to provide free-flowing catalyst particulate. It is understood that aluminoxane used in the lab is actually a mixture of aluminoxane and trialkyl aluminum. Therefore, when one of the most the common aluminoxanes, isobutylaluminoxane, is used as the activator, the solution of dimethylsilanediylbis(2-methyl-4,5-benzindenyl)zirconium dichloride and isobutylaluminoxane would comprise the product of dimethylsilanediylbis(2-methyl-4,5-benzindenyl)zirconium dichloride and isobutylaluminoxane. Furthermore, Suhm expressly teaches that the metallocene catalyst composition may also comprise a further metallic compound alkylating component and triisobutylaluminum is exemplified as one of the preferred embodiments. Therefore, it would have been obvious to a skilled artisan to alkylate the chlorinated metallocene (which often has poor solubilities in hydrocarbons) to provide the alkylated metallocene with improved solubilities in the reaction media since the alkylated metallocene is more readily activated by activators such as aluminoxanes and borates

and to provide a supported catalyst with minimized unsupported metallocene and thus reduce fouling during the polymerization process and in the absence of any showing criticality and unexpected results. When the alkylated metallocene prepared by treating the chlorinated metallocenes with alkyl aluminum is used to prepare the catalyst composition, the teaching of the cited prior art meets the limitations of the instant claims.

RESPONSE

Applicant respectfully traverses the rejection of claims 16-24.

The U.S. Supreme Court in *Graham v. John Deere Co.*, 148 U.S.P.Q. 459 (1966) held that non-obviousness was determined under §103 by (1) determining the scope and content of the prior art; (2) ascertaining the differences between the prior art and the claims at issue; (3) resolving the level of ordinary skill in the art; and, (4) inquiring as to any objective evidence of non-obviousness.

Accordingly, for the Examiner to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. See MPEP §2142.

First and foremost, Applicant respectfully notes the previous Office Action, with a mailing date of December 29, 2006, states in part,

Claims 16-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Suhm et al. (WO 01/46274, the equivalent US 2003/0130443 is referred hereinafter).

Suhm's paragraphs [0311] to [0313] on page 14 as cited in the previous Office action teaches a process for making a supported catalyst comprising (i) reacting silica and methylaluminoxane (MAO) in a solution to provide a treated silica; subsequently (ii) contacting the solution of dimethylsilanediylbis(2-methyl-4,5-benzindenyl) zirconium dichloride and MAO with the treated silica to provide a slurry, and (iii) distilling off the solvent in vacuo to provide free-flowing catalyst particulate. **It is understood that MAO used in the lab is actually a mixture of methylaluminoxane and trimethyl aluminum,** thus, the solution of dimethylsilanediylbis(2-methyl-4,5-benzindenyl)zirconium dichloride and MAO comprising the product of dimethylsilanediylbis(2-methyl-4,5-benzindenyl)zirconium dichloride and **trimethyl aluminum.** Thus, Suhm's solution of dimethylsilanediylbis(2-methyl-4,5-benzindenyl)zirconium dichloride and MAO comprises the reaction product of dimethylsilanediylbis(2-methyl-4,5-benzindenyl) zirconium dichloride and **trimethyl aluminum.** Therefore, Suhm's teaching anticipates the instant claims. (Emphasis added)

However, the current Office Action, with a mailing date of November 28, 2007, states in part,

Suhm's paragraphs [0311] to [0313] on page 14 as cited in the previous Office action teaches a process for making a supported catalyst comprising (i) reacting silica and methylaluminoxane (MAO) in a solution to provide a treated silica; subsequently (ii) contacting the solution of dimethylsilanediylbis(2-methyl-4,5-benzindenyl) zirconium dichloride and MAO with the treated silica to provide a slurry, and (iii) distilling off the solvent in vacuo to provide free-flowing catalyst particulate. **It is understood that aluminoxane used in the lab is actually a mixture of aluminoxane and trialkyl aluminum.** Therefore, when one of the most the common aluminoxanes, isobutylaluminoxane, is used as the activator, the solution of dimethylsilanediylbis(2-methyl-4,5-benzindenyl) zirconium dichloride and isobutylaluminoxane would comprise the product of dimethylsilanediylbis(2-methyl-4,5-benzindenyl) zirconium dichloride and isobutylaluminoxane. Furthermore, Suhm expressly teaches

that the metallocene catalyst composition may also comprise a further metallic compound alkylating component and triisobutylaluminum is exemplified as one of the preferred embodiments. Therefore, it would have been obvious to a skilled artisan to alkylate the chlorinated metallocene (which often has poor solubilities in hydrocarbons) to provide the alkylated metallocene with improved solubilities in the reaction media since the alkylated metallocene is more readily activated by activators such as aluminoxanes and borates and to provide a supported catalyst with minimized unsupported metallocene and thus reduce fouling during the polymerization process and in the absence of any showing criticality and unexpected results. When the alkylated metallocene prepared by treating the chlorinated metallocenes with alkyl aluminum is used to prepare the catalyst composition, the teaching of the cited prior art meets the limitations of the instant claims. (Emphasis added)

Accordingly, Applicant respectfully believes the Examiner has not explained the deviation between the two Office Actions outlined above. In particular, in the Office Action having a mailing date of December 29, 2006, the Examiner argued **methylaluminoxane** (i.e., MAO) also contained **trimethyl** aluminum. Accordingly, Applicant respectfully noted in Applicant's previous response, claim 16 recites, in part, "wherein the organometallic compounds of formula (VIII) comprise **at least one branched alkyl radical** comprising up to 10 carbon atoms, **or a cycloalkyl radical** comprising from 3 to 10 carbon atoms. . . ." Therefore, the Examiner's argument outlined in the Office Action of December 29, 2006 was rendered moot.

However, now in the currently pending Office Action, the Examiner has made the broad-brush argument that **all** aluminoxanes (i.e., the much broader and more generic class of compounds) are

actually a mixture of the **aluminoxane** and the corresponding **trialkyl** aluminum compound. However, Applicant respectfully believes the Examiner has still not explained why, absent Applicant's specification and currently pending claims, one would have arrived at Applicant's currently claimed process comprising at least one organometallic compound of formula (VIII), wherein the organometallic compounds of formula (VIII) comprise at least one **branched alkyl radical** comprising up to 10 carbon atoms, **or a cycloalkyl radical** comprising from 3 to 10 carbon atoms. Yet this is the Examiner's initial burden to establish a *prima facie* case of obviousness. See MPEP §2142. For this reason alone, Applicant respectfully believes the current rejection should be withdrawn.

Notwithstanding the above, the Examiner states in the current Office Action,

Suhm's paragraphs [0311] to [0313] on page 14 as cited in the previous Office action teaches a process for making a supported catalyst comprising (i) reacting silica and **methylaluminoxane (MAO)** in a solution to provide a treated silica; subsequently (ii) contacting the solution of dimethylsilanediylbis(2-methyl-4,5-benzindenyl) zirconium dichloride and **MAO** with the treated silica to provide a slurry, and (iii) distilling off the solvent in vacuo to provide free-flowing catalyst particulate. It is understood that aluminoxane used in the lab is actually a mixture of aluminoxane and trialkyl aluminum. **Therefore, when one of the most the common aluminoxanes, isobutylaluminoxane, is used as the activator, the solution of dimethylsilanediylbis(2-methyl-4,5-benzindenyl) zirconium dichloride and isobutylaluminoxane would comprise the product of dimethylsilanediylbis(2-methyl-4,5-benzindenyl) zirconium dichloride and isobutylaluminoxane. (Emphasis added)**

However, as noted by the Examiner, the highlighted sections in Suhm, et al. disclose preparing a solid catalyst by: (i) reacting silica with **methylaluminoxane** (MAO) in solution, and subsequently drying the resultant **methylaluminoxane**-loaded silica; (ii) adding the **methylaluminoxane**-loaded silica to a solution of rac-dimethylsilanediylbis(2-methyl-4,5-benzindenyl) zirconium dichloride in a **methylaluminoxane** (MAO) solution; and (iii) distilling off the solvent, and drying the catalyst. See paragraphs [0310] to [0311] in Suhm, et al. Accordingly, Applicant respectfully believes Suhm, et al. discloses using **methylaluminoxane** (MAO) to treat the silica support, and then adding **methylaluminoxane** in slurry with the aforementioned metallocene. However, Applicant is currently claiming, in part, a process wherein a metallocene compound of formula (I) is reacted with at least one organometallic compound of formula (VIII), wherein the organometallic compounds of formula (VIII) comprise at least one **branched alkyl radical** comprising up to 10 carbon atoms, or a **cycloalkyl radical** comprising from 3 to 10 carbon atoms. Therefore, clearly, Suhm, et al. discloses a different process than Applicant is currently claiming.

The Examiner tries to account for this factual difference by stating in the current Office Action,

Therefore, when one of the most the common aluminoxanes, isobutylaluminoxane, is used as the activator, the solution of dimethylsilanediylbis(2-methyl-4,5-benzindenyl) zirconium dichloride and isobutylaluminoxane would comprise the product of dimethylsilanediylbis(2-methyl-4,5-benzindenyl) zirconium dichloride and

isobutylaluminumoxane. Furthermore, Suhm expressly teaches that the metallocene catalyst composition may also comprise a further metallic compound alkylating component and triisobutylaluminum is exemplified as one of the preferred embodiments.

However, Applicant respectfully traverses the Examiner's conclusion on two grounds, which are outlined below. First and foremost, the Examiner has not elucidated *why*, absent Applicant's specification and currently pending claims, one would have deviated from the express disclosure of Suhm, et al. and used isobutylaluminumoxane in lieu of **meth**ylaluminumoxane (MAO) in solution with rac-dimethylsilanediyibis(2-methyl-4,5-benzindenyl) zirconium dichloride as disclosed in Suhm, et al. However, as outlined *supra*, this is the Examiner's initial burden to establish a *prima facie* case of obviousness. See MPEP §2142.

Additionally, Applicant respectfully traverses the Examiner's conclusionary statement that,

Furthermore, Suhm expressly teaches that the metallocene catalyst composition may also comprise a further metallic compound alkylating component and triisobutylaluminum is exemplified as one of the preferred embodiments.

However, Applicant respectfully believes the Examiner has not taken the full disclosure of Suhm, et al. into account with respect to component C), nor has the Examiner explained *why*, absent Applicant's specification and claims, one having ordinary skill in the art would have deviated from the express disclosure of Suhm, et al. at the points selected by the Examiner. In particular, Suhm, et

al. discloses in paragraph [0153],

Suitable metallocene catalysts **may** also comprise, as further component C), a metallic compound of the general formula (VI). . . . (Emphasis added)

Accordingly, Suhm, et al. discloses the metallocene catalysts therein may, or may not, comprise an additional component C). However, the Examiner has not explained *why*, absent Applicant's specification and currently pending claims, one would have absolutely selected component C) to be present.

Notwithstanding the above, Suhm, et al. then goes on to disclose component C) can be a myriad of compounds, including triisobutylaluminum, which has been selectively plucked from the myriad of other compounds by the Examiner. See paragraphs [0153]-[0164]. However, Applicant respectfully believes the Examiner has not explained *why*, absent Applicant's specification and currently pending claims, one of ordinary skill in the art would not only have absolutely selected component C) to be present, but also the particularly plucked triisobutylaluminum to be present. Yet, this is the Examiner's initial burden to establish a *prima facie* case of obviousness. See MPEP §2142.

In spite of the above, even if one were to absolutely select component C) to be present, and one were to selectively pluck triisobutylaluminum from the myriad of other compounds component C) could be from Suhm, et al., which Applicant respectfully denies one of ordinary skill in the art would have done, despite all of this,

Applicant believes one of ordinary skill in the art would not have used the selectively plucked triisobutylaluminum in the process as currently claimed by Applicant. In particular, Suhm, et al. discloses in paragraph [0313] triisobutylaluminum is used as a radical scavenger during polymerization, and not in the process as currently claimed by Applicant. Accordingly, even if one were to proceed as purported by the Examiner and absolutely select component C) to be present, as well as selectively pluck triisobutylaluminum from the myriad of other compounds component C) could be, despite all of this, which Applicant denies one of ordinary skill in the art would do, Applicant respectfully believes one of ordinary skill in the art would have used triisobutylaluminum as a radical scavenger during the polymerization process, and not as currently claimed by Applicant. In fact, nothing in the disclosure of Suhm, et al. discloses anything to the contrary. Therefore, for the reasons outlined above, Applicant respectfully believes the current rejection should be withdrawn.

Albeit, Applicant has submitted new claims 25-44 herewith this response as ATTACHMENT A. In particular, new claim 25 states, in part, the molar ratio of M^1 from the organometallic compounds of formula (VIII) to M from the metallocene compounds of formula (I) ranges from 800:1 to 1:1. Additionally, new claim 26 states, in part, the molar ratio of M^1 from the organometallic compounds of formula (VIII) to M from the metallocene compounds of formula (I) ranges from 200:1 to 2:1. Further, new claim 35 states, in part,

the atomic ratio of aluminum from the aluminoxanes to M from the metallocene compounds of formula (I) ranges from 20:1 to 500:1, while new claim 36 states, in part, the atomic ratio of aluminum from the aluminoxanes to M from the metallocene compounds of formula (I) ranges from 30:1 to 400:1.

As outlined in Applicant's specification, Applicant has unexpectedly found the currently claimed process, including Applicant's currently claimed process in new claims 25-44, remedy the deficiencies of previous processes when the amount of aluminoxanes are reduced. In particular, Applicant's specification on page 2, lines 23-33, states,

However, the catalyst systems known from the prior art have the disadvantages that the reduction in the amount of aluminoxane used or its partial replacement by organometallic compounds leads to not inconsiderable adverse effects on the productivity and the morphology of the polymers formed or the preparation of the catalyst systems is complicated since a prepolymerization of the catalyst solids and a series of washing steps are necessary.

It is an object of the present invention to remedy the disadvantages mentioned and to find catalyst systems which, despite a considerably reduced aluminoxane content, display a very good productivity, lead to polymers having a good morphology and form no deposits in the polymerization reactors during the polymerization, and require no complicated process steps such as prepolymerization or multiple washing steps for their preparation.

Additionally, Applicant's specification states on page 19, lines 12-14,

The results show the catalyst solids of the present invention give a good morphology of the resulting polymer

and an improved productivity despite a reduction in the amount of MAO or allow the amount of MAO used to be reduced significantly while maintaining the same productivity.

To illustrate this point better, Applicant submits herewith ATTACHMENT B outlining the productivity of Examples 1-5, as well as Comparative Examples A-B. As outlined in ATTACHMENT B, the average productivity of Examples 1-5 in 1L is **more than 43% better** than Comparative Examples A-B, while Examples 1-5 in 10L is **more than 20% better** than Comparative Examples A-B*. Accordingly, for the reasons outlined *supra*, Applicant respectfully believes the currently claimed process is patentably distinct from Suhm, et al.

In light of the above, claims 16-44 are therefore believed to be patentable over Suhm, et al. Accordingly, reconsideration and withdrawal of the rejection is respectfully requested.

CONCLUSION

Based upon the above remarks, the presently claimed subject matter is believed to be novel and patentably distinguishable over the references of record. The Examiner is therefore respectfully requested to reconsider and withdraw all rejections, and allow all pending claims 16-44. Favorable action with an early allowance of the claims pending in this application is earnestly solicited.

*Only includes Comparative Example A

Serial No. 10/539,881

The Examiner is welcomed to telephone the undersigned
practioner if she has any questions or comments.

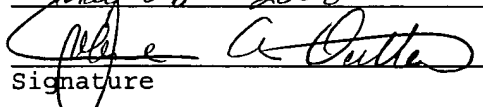
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ATTACHMENT B

| | 1L (productivity g of PP/g of catalyst) | 10L (productivity g of PP/g of catalyst) |
|--|---|--|
| Example 1 | 4100 | 6200 |
| Example 2 | 3900 | 5500 |
| Example 3 | 3950 | - |
| Example 4 | 4700 | 8900 |
| Example 5 | 4500 | 7200 |
| Comparative Example A | 4200 | 5500 |
| Comparative Example B | 1700 | - |
| Average of Examples 1-5 | 4230 | 6950 |
| Average of Comparative Examples A-B | 2950 | 5500* |

*Only includes Comparative Example A